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To the Written Opinion of the International Searching Authority mailed September 29, 2004

In the Written Opinion, the International Searching Authority states that the subject matter of amongst others independent claims 1 and 10 is not new over the disclosure of document **US 6,477,195 B2 (D1)**. This finding, however, appears to be based on a misunderstanding of the meaning of the claims and the respective disclosure of the prior art documents.

In particular, document D1 discloses a process and an electric-arc furnace for melting sponge iron wherein the sponge iron is introduced into the furnace via chutes or slides 12 through cover holes 10 and falls in the form of a trajectory parabola or substantially vertically into the metal melt 7. The sponge iron is introduced in lumpy form (pellets and/or briquets) which optionally may be supplemented partly in the form of fines (see column 2 lines 47 to 50 of D1). The supply of the sponge iron to the cover holes 10 is effected via a flap valve or the like (not numbered but depicted in Figures 1 and 2). Such flap valve is provided directly below the hopper for introducing the sponge iron at the upper end of slide 12. The sponge iron then slides along the down pipe and falls into the furnace through the open end of the down pipe. No dosing orifice is provided at the end of the down pipe. In the embodiment according to Figure 6, wherein the bulk material falls vertically onto the melt, there appears to be a flap valve in down pipe 10 with a fixed left part and an opening right part.

Similar to the prior art as disclosed in document GB 1,104,690 cited in the introductory part of the original description, the process and apparatus according to D1, therefore, is intended for the processing of lumpy and thus substantially coarse materials.

Such devices, however, are not suitable for charging fine-grained particles into the furnace because the stream of bulk material would be considerably enlarged during the free fall into the furnace such that the fine particles would be entrained by the gases ascending the from the hot iron bath. Indeed, Figures 1 and 3 (for the trajectory parabola) as well as Figure 6 (for the vertical fall) of document D1 clearly show the enlargement of the stream of bulk material between the exit from the cover hole 10 and the metal bath surface.

It is, therefore, the object of the invention to provide for charging fine-grained directly reduced iron or the like in a constructively simple way ensuring rather loss-free introduction of the fine-grained material into the metal bath of the electric-arc furnace.

According to the present invention, this object essentially is solved by passing the bulk material stream through a dosing orifice before entering the furnace but after the down pipe such that the material stream enters the furnace essentially undisturbed.

The dosing orifice allows for the control of the material stream to provide for an undisturbed entry into the furnace.

As pointed out above, document D1, in its embodiment according to Figures 1 to 4, provides for a flap valve immediately following the hopper in the upper part of the down pipe. In the embodiment according to Figures 5 and 6, a flap valve appears to be provided in down pipe 10. A flap valve cannot be regarded as a dosing orifice as it does not allow for an adjustable control (dosing) of the material stream. Rather, a flap valve either opens or closes. No dosage is possible. Further, it is clearly evident from Figure 6 that the bulk material stream is disturbed by the flap valve. In particular, in Figure 6 the left part of the valve is fixedly directed into the path of the material. Further, the right part of the valve, which is opened to let the material stream pass through the valve, projects into the stream and thereby disturbs the material stream upon entering the furnace. Figure 6 shows that this leads to a substantial enlargement of the bulk material stream and corresponding losses.

The claimed feature of passing the material stream through a dosing orifice after the down pipe before entering the furnace such that the material stream enters the furnace undisturbed, therefore, is not shown in document D1. Further, document D1 differs from the pre-

sent invention in that it is intended for introducing the sponge iron in lumpy (coarse) form into the furnace.

The other documents on file cannot make up for the deficiencies of document D1 as they neither disclose any dosing orifice provided after the down pipe before entering the furnace nor enters the material stream the furnace essentially undisturbed.

In particular, according to document **US 3,634,592 (D2)** the sponge iron is charged into the electric-arc furnace through vertical risers 4 and charging openings. The amount of material charged into the furnace is controlled by a metering device 5 and a distributor 10 way before the material is passed on to the furnace. At the charging opening ends of the risers 4 no dosing orifice is provided. The entry into the furnace is not discussed in this reference.

Document **FR 2 681 937 A3 (D3)** does not disclose the continuous feed of fine-grained material into a furnace but charging the metal products as packages. Electric magnets 17 are provided on the down pipe for agglomerating the packages of material. At the opening into the furnace no dosing orifice is provided, so that the material stream cannot be controlled at this position.

The other documents on file have not been explicitly referred to in the Written Opinion with regard to the claims nor have they been considered relevant in the International Search Report with regard to independent method claim 1.

Accordingly, the subject matter of pending claim 1, i.e. passing the material stream through a dosing orifice after the down pipe and before entering the furnace in order to control the material stream such that it enters the furnace essentially undisturbed, is not disclosed nor rendered obvious by the prior art on file.

The same is true for independent apparatus claim 1 claiming in particular that at the opening of the down pipe into the furnace a round or oval dosing orifice is provided.

As stated above, document D1 does not disclose any round or oval dosing orifice at the opening of the down pipe into the furnace. In the embodiment of Figures 1 and 2 of D1 no dosing device at all is provided at the end of the down pipe. In the embodiment of Figure 6, a